

### **REMARKS**

Applicants respectfully request reconsideration of the prior art rejection set forth by the Examiner under 35 USC §§102 and 103. Applicants respectfully submit that the prior art references of record, whether considered alone or in combination, fail to either teach or suggest Applicants' presently claimed invention. Applicants' claimed invention is directed to an improved solid state image sensor device and method of driving a solid state image sensor device which is capable of operating in both an interlaced mode and a progressive mode wherein all of the signal charges are read out from the imaging device independently without being combined.

More specifically, the present invention is directed to an imaging device employing a photodiode and preferably a Hole Accumulation Diode as specified in dependent claims 4-6. See page 10 of the instant application. In the conventional HAD sensor, it is necessary to apply a bias voltage  $V_{sub}$  to the substrate for normal operations. Accordingly, a substrate bias terminal such as the terminal 2e described in the specification is employed. Conventional HAD sensors did not use adjustment of the bias voltage applied to the substrate terminal as described and claimed in the instant application.

None of the references cited by the Examiner provide the requisite teaching or suggestion to result in the claimed subject matter. More specifically, none of the references describe Applicants' claimed photodiode sensor wherein the substrate bias voltage is adjusted as specified in the claims depending on the type of read-out operations employed. Simply put, there is no suggestion in any of the references to apply the substrate bias adjustment

techniques described in the Suzuki reference to Applicants claimed photodiode and specifically the HAD described and claimed in the instant application. A proper rejection requires that a single reference describes the claimed subject matter or that there be a combination of references that teach or even suggest that a feature not present in a single reference would be applicable to the subject matter of a deficient reference. In the present situation, there is no reference or combination of references that indicates the desirability of applying bias adjustment depending on the type of operation for a HAD sensor as claimed in the instant application **such that the saturation signal quantity in the progressive scan mode is substantially equivalent to the saturation signal quantity in the interlaced mode.**

Suzuki fails to teach such a device. While, as cited by the Examiner, Column 12, lines 61 – 65 of the Suzuki reference teach that the saturation signal capacity can be increased in the full frame reading mode by applying a voltage  $V_{sub}$  to the substrate, Suzuki fails to teach or suggest wherein the saturation signal capacity after read-out in both modes is substantially equivalent. (See page 12 of Applicant's disclosure).

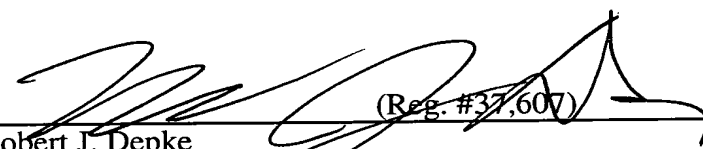
One of the deficiencies of the conventional driving techniques for solid state imaging devices is that in the progressive mode, one signal for each picture element is output so that the saturation signal quantity becomes half of that compared with the interlaced mode of operation. The saturation signal quantity is the maximum signal quantity that may be achieved when the solid state image sensor device outputs the correct signal. In the conventional mode of operation, during progressive output, there is a decrease in the saturation signal quantity which results in the degradation of the dynamic range for the device. Applicants claimed photodiode sensor overcomes the shortcomings and deficiencies

of the prior art by providing bias voltages such that saturation signal quantities in either progressive or interlaced mode are **substantially equivalent**.

Accordingly, in light of the foregoing, Applicants respectfully submit that the references of record fail to provide the requisite teaching or suggestion to support the rejection of the claims as set forth by the Examiner. Applicants respectfully request that the Examiner now withdraw these rejections and allow all claims in the application.

Respectfully submitted,

Date: 8/4/05

  
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Appl. No. 09/324,823  
Amdt. Dated August 4, 2005  
Response to Office Action Mailed May 9, 2005

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